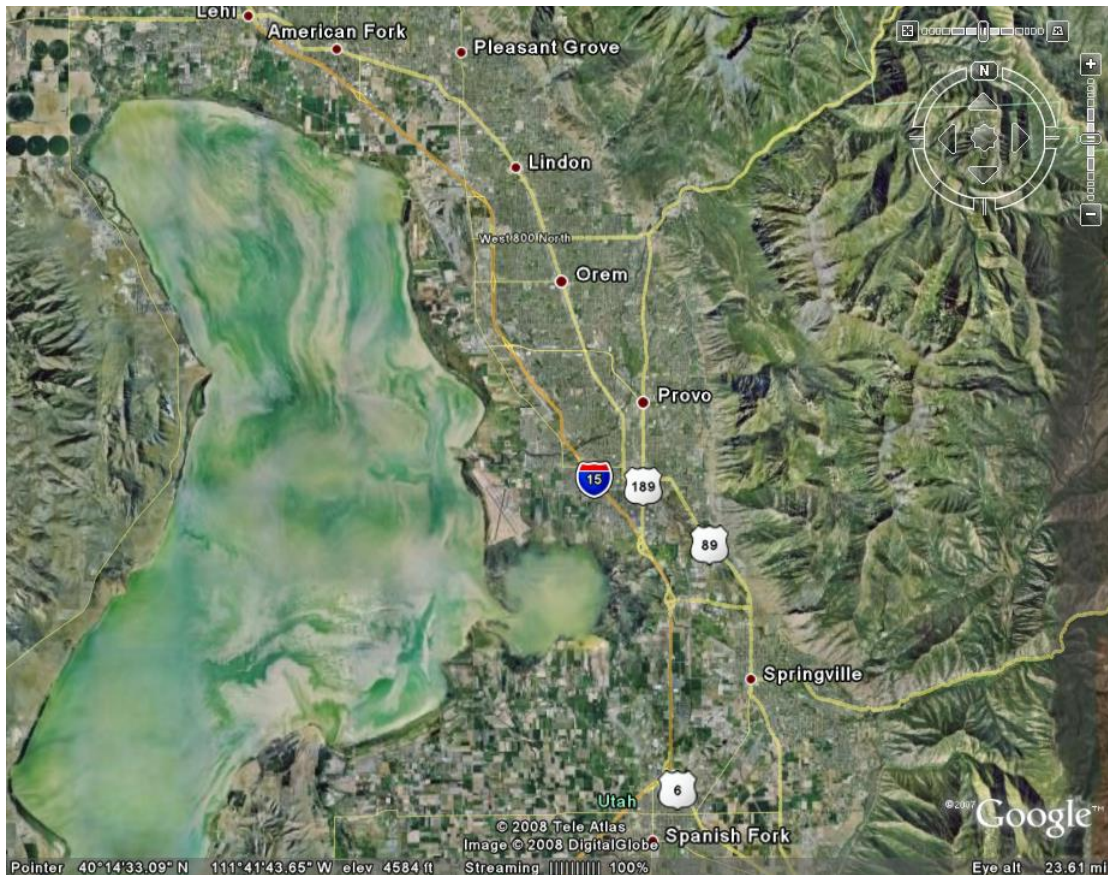




Bridge Inventory & Structural Recommendation Report
for
Bridge Replacements of
I-15 Phase 1 Reconstruction:
US-6 in Spanish Fork to American Fork Main Street



Region: 3
Pin: 7037
FiNet Number: 70963

Project Manager: Dal Hawks
Project Number: IM-NH-15-6(149)245 E
Fiscal Year: 2010

Prepared By:
Brent Wallwork, Justin Jar, Chris Potter, Richard Miller, Cody Buzianis – 7/11/08
Director of Bridge Operations:
Rukhsana Lindsey
Director of Bridge Design:
Stan Burns

Executive Summary

This Concept Report presents a conceptual overview for the structural work associated with the I-15 reconstruction project in Utah County. It contains the need, scope, methods, and cost estimate for Phase 1 of this project. The UDOT Structures Division provides Accelerated Project Delivery in the form of Accelerated Bridge Construction (ABC) methods on this project. UDOT has committed to provide their customers with Accelerated Project Delivery-ABC methods on a programmatic level. Use of ABC methods will: minimize user costs, reduce time associated with detours and construction slow downs, minimize/reduce traffic and railroad disruptions, improve work zone safety, improve the quality of the work, improve worker safety, reduce design costs by applying similar designs to structures, reduce cost of structural elements (due to similar structural elements), provide rapid bridge construction, etc.

The Draft Environment Impact Statement identifies transportation-related needs associated with this project, including interchange and bridge deficiencies. According to population growth projections, by 2030 peak hour congestion will exceed acceptable levels at 20 of the 22 interchanges on I-15 along the study corridor. Within the 22 interchanges, 46 of 60 components will have an unacceptable level of service. Additionally, 13 bridges along the study corridor require replacement or significant repair.

The entire I-15 reconstruction project extends from the South Payson interchange in Utah County to the 12300 South interchange in Salt Lake County. This Concept Report is limited to Phase 1 of the project, which extends from the US-6 interchange in Spanish Fork (excluding the US-6 bridges) to American Fork Main Street. The scope of Phase 1 includes the removal and reconstruction of 43 bridges, the modification of 2 bridges, and the addition of 7 new bridges.

The estimated cost for structure work is \$672 million in 2009 dollars, the year the Design-Build contract is to be awarded. This number consists of \$470 million in structural work. The structural work includes costs for removal of existing structures, construction of new bridges, construction of new MSE walls, addition of polymer overlays, and construction of applicable MOT temporary structures. Unit costs assume Accelerated Bridge Construction Methods. Costs for utility relocation, traffic control, mobilization, public information services, and railroad coordination are assumed to be covered in the roadway costs and are not included in this estimate. \$47 million in P.E. costs, \$47 million in C.E. costs, and a \$47 million contingency are added to the \$470 million for a total of \$611 million. 10% inflation for one year is applied (estimate completed in 2008), arriving at \$672 million for the total cost.

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Scope of Project:

1. Purpose of Report:

This report presents a conceptual overview for bridge replacements pertaining to Phase I of the I-15 reconstruction in Utah County. It is intended to convey the need, scope, and cost estimate for the structure portion of the project.

2. Project Information:

Region: 3 **Route No.:** I-15 **Date:** May 30th, 2008

Project Name: I-15 Phase I Reconstruction, US-6 to American Fork Main Street

Beg. R.P.: 257.76 – 278.80

Project Number: IM-NH-15-6(149)245 E **PIN:** 7037

Project Design: Bridge: To Be Determined; Roadway: To Be Determined

Project Mgr: Dal Hawks

3. Deficiencies: (Taken from Draft Environmental Impact Statement):

Several transportation-related needs were identified along the I-15 corridor in Utah and Salt Lake counties. First, there is a need to avoid the unacceptable level of congestion which is projected to occur due to increased travel demand in the I-15 corridor. Based on projected growth in population and vehicle miles traveled, it is expected that by 2030, the Level of Service on 20 of 21 mainline I-15 segments will be at or over capacity. Additionally, peak hour congestion will also exceed acceptable levels at one or more of the interchange components (including ramps, ramp termini intersections and intersections adjacent to ramp termini) at 20 of the 22 interchanges on I-15 along the study corridor. Within the 22 interchanges, 46 of 60 components will have an unacceptable level of service. These 2030 projections assume that all other highway and transit projects in applicable regional transportation plans, including commuter rail and the Mountain View Corridor project, have been implemented. There is also a second need to address substandard I-15 roadway features, which contribute to both congestion and safety concerns. Analysis of the existing I-15 roadway indicates that there are 15 vertical curves and 2 horizontal curves that are substandard due to inadequate stopping sight distance; two ramps which have inadequate acceleration length; and 13 bridges which require replacement or significant repair. Crash analysis of I-15 indicates that for 11 out of the 14 crash analysis segments in the project area, the crash severity rate exceeds the statewide average for similar roadways.

The first need for the Project – avoiding unacceptable congestion on I-15 – will be partially served by the commuter rail project that was previously being considered in this National Environmental Policy Act (NEPA) document but now is proceeding independently as a locally funded Utah Transit Authority (UTA) project. However, as indicated by the above-projected congestion levels on I-15, there is still a substantial need to be addressed by this project.

4. Plan

The Draft Environment Impact Statement (DEIS) details the plan for each structure in this project. UDOT selected preferred options from the DEIS. Option C is UDOT's preferred option for the American Fork Main Street interchange. Option D is UDOT's preferred option for the Provo-Orem area of I-15. A brief description of the plan for each structure, including UDOT preferred options, follows. The structures are listed in the order they occur along the project, starting in Spanish Fork. Following the list of structures are the other design options detailed in the DEIS which UDOT did not select as preferred options. These are included for information only.

The UDOT Structures Division provides Accelerated Project Delivery in the form of Accelerated Bridge Construction (ABC) methods on this project. UDOT has committed to provide their customers with Accelerated Project Delivery-ABC methods on a programmatic level. Use of ABC methods will: minimize user costs, reduce time associated with detours and construction slow downs, minimize/reduce traffic and railroad disruptions, improve work zone safety, improve the quality of the work, improve worker safety, reduce design costs by applying similar designs to structures, reduce cost of structural elements (due to similar structural elements), provide rapid bridge construction, etc. Applicable ABC methods are listed later in this report.

Structures:

Union Pacific Railroad North of US-6 in Spanish Fork – The existing bridges over the Union Pacific Railroad would be reconstructed and widened at two locations to accommodate the additional lanes on I-15.

Spanish Fork 2700 North – The existing bridge would be reconstructed over I-15. It would be lengthened to accommodate the additional lanes on I-15 and would be widened to accommodate improvements to Spanish Fork 2700 North as specified in the MAG Regional Transportation Plan.

South Springville (400 South) – The existing diamond interchange would be reconfigured to a Single Point Urban Interchange (SPUI). A Categorical Exclusion is currently being prepared as a separate project.

North Springville (1400 North) – Ramp modifications would be made to the existing diamond interchange, which has been recently reconstructed. The only work necessary would be at the ramp gores to accommodate a widened I-15 cross-section.

University Avenue – Ramp modifications would be made to the existing partial cloverleaf interchange, which has been recently reconstructed. The ramps would be modified to accommodate the widened I-15. Modifications to slope paving will be required to accommodate a wider I-15 at the SB University Avenue to SB I-15 structure, as well as the 1860 South structure over I-15.

Provo 500 West – A new I-15 bridge to accommodate a future 500 West undercrossing.

Provo 920 South – The existing I-15 bridge over Provo 920 South would be widened (not totally reconstructed) to accommodate the additional lanes on I-15.

Provo 600 South – The existing I-15 bridge over Provo 600 South would be widened (not totally reconstructed) to accommodate the additional lanes on I-15.

Provo Center Street (Provo/Orem Option D) – No frontage roads are provided with this option. The Provo Center Street Interchange would be reconstructed as a SPUI. The existing viaduct over the railroad tracks at Provo Center Street would be removed and replaced with a new structure.

Provo River – The existing I-15 bridge over the Provo River would be reconstructed and widened to accommodate the additional lanes on I-15.

Provo 820 North – The existing I-15 bridge over 820 North would be reconstructed and widened to accommodate the additional lanes on I-15.

UPRR and UTA at the S-Curves – The existing I-15 bridges over the UPRR and UTA tracks would be reconstructed and widened to accommodate the additional lanes on I-15.

Provo 2000 North / Orem 2000 South – The existing I-15 bridge over Provo 2000 North / Orem 2000 South would be reconstructed and widened to accommodate the additional lanes on I-15.

University Parkway (Provo/Orem Option D) – No frontage roads are provided with this option. A flyover ramp would be constructed from southbound I-15 to eastbound University Parkway. A direct connection to UVSC would be provided from the northbound I-15 exit at University Parkway. A new interchange at Orem 800 South would not be constructed.

Orem 400 South – The existing I-15 bridge over the Orem 400 South would be reconstructed and widened to accommodate the additional lanes on I-15.

Orem Center Street – The existing diamond interchange would be reconstructed and reconfigured to a SPUI. The existing roadway is five lanes east of I-15 and three lanes west of I-15. Center Street will be widened at the interchange to five lanes on both sides of I-15. 1200 West would be realigned to the east to create an intersection with Center Street that does not conflict with the interchange ramps, thus improving the safety and capacity of the intersection.

Orem 400 North – The existing I-15 bridge over the Orem 400 North would be reconstructed and widened to accommodate the additional lanes on I-15.

Orem 800 North – The existing diamond interchange would be reconstructed and reconfigured to a SPUI. Orem 800 North would be widened to three lanes in each direction

through the interchange. The Orem 1200 West frontage road was recently realigned to the east to create an improved intersection with Orem 800 North.

Orem 1200 North – A new I-15 bridge to accommodate a future 1200 North undercrossing.

Orem 1600 North – The existing diamond interchange would be reconstructed to a new diamond interchange. Orem 1600 North would be widened to two lanes in each direction through the interchange.

Geneva Road – The existing I-15 bridge over Geneva Road would be reconstructed and widened to accommodate the additional lanes on I-15.

Lindon 200 South – The Lindon 200 South bridge would be reconstructed over I-15. The bridge would be lengthened to accommodate the additional lanes on I-15 and would be widened to accommodate the provisions for 200 South in the regional transportation plan.

Proctor Road – The Proctor Road bridge would be reconstructed over I-15. The bridge would be lengthened to accommodate the additional lanes on I-15 and would be widened to accommodate the provisions for Proctor Road in the regional transportation plan.

Pleasant Grove Interchange – Ramp modifications would be made to the existing diamond interchange, which has been recently reconstructed. The ramps would be modified to tie in to the widened I-15. Pleasant Grove Boulevard would be widened to two lanes in each direction through the interchange.

American Fork 1100 South (Sam White Lane) – The 1100 South bridge would be reconstructed over I-15. The bridge would be lengthened to accommodate the additional lanes on I-15 and would be widened to accommodate the provisions for 1100 South in the regional transportation plan.

American Fork 500 East – The existing diamond interchange would be reconstructed to a new diamond interchange. American 500 East would be widened to two lanes in each direction through the interchange. The interchange ramps would be widened.

American Fork 100 East – The existing I-15 bridge over 100 East would be reconstructed and widened to accommodate the additional I-15 lanes.

American Fork River – The existing I-15 bridge over the American Fork River would be reconstructed and widened to accommodate the additional lanes on I-15.

American Fork 200 South – The existing I-15 bridge over American Fork 200 South would be reconstructed and widened to accommodate the additional lanes on I-15.

American Fork Main Street Option C – The existing diamond interchange would be reconstructed to a SPUI. Main Street would be realigned and cross over I-15, run north of the adjacent railroad, cross over the railroad at Mill Pond Road, and connect to the proposed

Northern Utah County East-West Connections Project (Lehi 1000 South) at 300 East in Lehi.

Other Design Options (Not Selected As UDOT Preferred Options):

Provo/Orem Option A – A two-lane, one-way frontage road system would be constructed in both directions between the Provo Center Street and the University Parkway Interchanges. Access to and from the frontage roads would be provided at Provo 820 North, Provo 1740 North, and Provo 2000 North/Orem 2000 South. A new diamond interchange would be constructed at Orem 800 South. The existing Provo Center Street Interchange would be reconstructed to a diamond or SPUI interchange designed to accommodate the frontage roads. The existing viaduct over the railroad tracks at Provo Center Street would be removed and replaced with a new structure.

Provo/Orem Option B – A one-way frontage road system would be constructed in both directions between the Provo Center Street Interchange and the University Parkway Interchange. Access to and from the frontage roads would be provided at Provo 820 North, Provo 1740 North, and Provo 2000 North/Orem 2000 South. A flyover ramp would be constructed from southbound I-15 to eastbound University Parkway. A direct connection to UVSC would be provided from the northbound I-15 exit at University Parkway. A new interchange at Orem 800 South would not be constructed. The existing Provo Center Street Interchange would be reconstructed to a diamond or SPUI interchange designed to accommodate the frontage roads. The existing viaduct over the railroad tracks at Provo Center Street would be removed and replaced with a new structure.

Provo/Orem Option C – No frontage roads are provided with this option. The Provo Center Street Interchange would be reconstructed as a SPUI. The existing viaduct over the railroad tracks at Provo Center Street will be removed and replaced with a new structure. A new diamond interchange would be constructed at Orem 800 South.

American Fork Main Street Option A – The existing diamond interchange would be reconstructed to a diamond interchange. Main Street would cross over I-15 on the existing alignment, cross over the railroad at Mill Pond Road, and connect to the proposed Northern Utah County East-West Connections Project (Lehi 1000 South) at 300 East in Lehi.

American Fork Main Street Option B – The existing diamond interchange would be reconstructed to a SPUI. Main Street would be realigned and cross over I-15 and the railroad, run south of the adjacent railroad along American Fork 200 South, and connect to the proposed Northern Utah County East-West Connections Project (Lehi 1000 South) at 300 East in Lehi.

5. Construction/Design Considerations

a. Management of Traffic (MOT):

- Temporary bridges for I-15 traffic at reconstructed interchanges

b. Right-of-Way:

- ROW impacts due to expansion of I-15

c. Third-Party Interests:

- Utility corridor impacts.
- Impacts to local residences and retailers

d. Geotech:

- Soil settlement requirements potentially make geotech the critical path in the project schedule

6. Accelerated Bridge Construction Methods:

- SPMT's/Sliding
- Staging areas
- Prefabricated/precast bridge elements- abutments, approach slabs, decks, MSE walls, etc.

7. Work items to be completed as part of this project:

- Varies per structure. See "Section 4 – Plan" for work to be completed at each structure.

8. Work items to be deferred:

N/A

9. Design Exceptions Required:

Design Exceptions are not expected.

10. Maintenance Considerations:

Applicable Region 3 Maintenance Station and Utah County should be included in the concept development.

11. Risk Analysis:

None anticipated at this time.

12. Development Process:

New or Major Reconstruction	<u> x </u>
Rehabilitation	<u> </u>
Preservation	<u> </u>

Schedule & Milestones:

This is a Design/Build project:

- | | | |
|------------------------------|--------|------|
| 1. Design-Builder Selection | Summer | 2009 |
| 2. Beginning of Construction | Spring | 2010 |

3. Completion of Construction	Fall	2014
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Funding Overview:

1. Funding Source:	State of Utah
2. Amount Programmed:	\$2,600,000,000 contract award date-summer 2009
3. Structure Cost Estimate:	\$672,000,000 contract award date-summer 2009 (see detailed cost estimate below)

Appendix

Advantages of Using ABC Methods Versus Traditional:

- **Minimizes User Delay Costs**

2009 - Design Build Award Year

ABC Structures Cost	User Delay Reduction - Anticipated 25% of ABC Structures Cost	Net ABC Cost	Conventional Cost
	\$ 672,089,970	\$ 672,089,970	
	<u>x 0.25</u>	<u>- \$ 168,022,492</u>	
\$ 672,089,970	\$ 168,022,492	\$ 504,067,477	\$ 503,669,225

- **Design Savings Using Standardized Bridge Elements**
- **Material Savings Using Standardized Bridge Elements**
- **Construction Time Reduced Using Standardized Details**
- **Minimizes Traffic Control Costs**
- **Improves Material Quality**
- **Reduces Long-Term Maintenance Costs**
- **Remote Staging Minimizes Environmental Impacts**
- **Improves Work Zone Safety For Workers And Travelling Public**
- **Improves Public Perception**
- **Minimizes Impacts To Business Owners**

Calculation of User Costs

User Costs are a function of:

1. Detour length
 - Intersection Delay
2. Lane reduction length

3. AADT

- **% Cars (\$13/hr)**
- **% Trucks (\$30/hr)**